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Analogs for the future Swiss climate

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Projected climate change in in the European Alps as represented by the current EURO-CORDEX regional climate scenario ensemble can be associated with a considerable modification of the present-day temperature and precipitation climate. In terms of climate communication, it can however be difficult to grasp the meaning and the consequences of, for instance, a 2.5 °C temperature increase in wintertime or a 20 % summer precipitation decrease. To better illustrate such changes, climate analogs can be useful. Climate analogs are locations that today experience a climate that is similar to the projected (i.e. the future) climate of a given site of interest. The recent work by Dahinden et al. (2017) introduced a method to identify such analogs based on the normalized similarity of climatological seasonal mean values of temperature and precipitation between the projected climate for a site of interest, and the present-day climate of a potential analog.

Here, a modified version of this technique is applied to identify climate analogs for individual sites in Switzerland. For this purpose, bias-adjusted EURO-CORDEX scenarios for the RCP8.5 emission scenario and for the end of the century (2070-2099) are used. As potential analogs 2472 stations in Europe are considered, for which the present-day climate of the reference period 1981 - 2010 can be derived based on available daily observation data (data sources: ECAD, GSOD and the automated MeteoSwiss network).

Exemplary results in terms of combined temperature and precipitation analogs (maximum normalized similarity of seasonal mean values for both variables) for the four sites Zurich, Weissfluhjoch, Lugano and Sion are shown. For all stations except Weissfluhjoch the best analogs are found at more southern latitudes and are mostly located in the Mediterranean region. An exception is the fourth-ranked analog for Zurich which is located at the coast of the Black Seas (Sochi, Russia). For the high-alpine site of Weissfluhjoch climate analogs can be found in the Alpine region itself, but are typically located at lower elevations in Italy and Germany.

If projected future precipitation is disregarded and only temperature conditions are considered, the best climate analogs are typically found at even more southern locations. Here, present-day temperature conditions are close to the projected climate for Swiss sites for RCP8.5 at the end of the Century but drier climates than projected for Switzerland typically prevail. The latter is the reason why these sites are typically not among the combined temperature and precipitation analogs. For Zurich the five best temperature analogs are all located in Spain while for Lugano and Sion they are spread along the entire coastline of the Mediterranean Sea. For Weissfluhjoch, again, geographically closer analogs that are located at lower elevations are found. An outstanding exception is the Russian site of Vajda-Guba located on a Russian peninsula in the Barents Sea which is the second-best temperature analog for Weissfluhjoch.

F Dahinden, EM Fischer, R Knutti (2017) Future local climate unlike currently observed anywhere. Environ. Res. Lett. 12(8) 084004